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Hodell-Natco Industries, Inc. v. SAP America, Inc. , et al.

Expert Opinion

Version 3.3

July 2012

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At the request of Koehler Neal LLC, I have developed an assessment of the suitability of SAP Business One for Hodell-Natco Industries, Inc., specifically, and assessed the architecture and limitations of that software, generally. My report follows. Exhibits which support my report are contained in Appendix 1. This report was prepared solely for use in the above-captioned litigation and should not be used for any other purpose without prior written authorization.

To the extent any party produces any additional information, I reserve the right to update my analysis and incorporate such additional information and analysis into my report.

Text and illustrations were compiled with utmost care. However, the author will not take responsibility or be held liable for any possible remaining incorrect information and the resulting consequences thereof. Readers of this document are urged to reevaluate all statements against their own particular situation as circumstances may vary considerably.

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I am an IT analyst with considerable experience in analyzing software architecture, performance limitations and systems requirements with a specific focus upon SAP products. I am presently teaching in the area of Enterprise Resource Planning ("ERP") systems at Munich University of Applied Sciences and am the Managing Partner, Research Director of Strategy Partners International whose main focus is upon ERP (SAP), ERP-related services, strategic purchasing advice for ERP customers, product management and marketing services for vendors, and am the initiator of the Sapience/Sapientia initiative to promote free competition in the SAP market.

From 1989 to 1995, I served in various capacities for Gartner, Inc. in Munich, Germany, including Research Director, SMS and AAS Services. From 1987 to 1989, I was a Consulting Unit Manager for Digital Equipment. As is detailed in the resume accompanying this report, I previously held positions with Software AG (1987, Senior Systems Architect), Nixdorf Computer AG (1980-1986, ultimately responsible for all software activities for 8890 worldwide), and Siemens AG (1972-1980, Manager for Product Planning BS 1000 and other positions).

I hold a M.A., in Economics from the Universities of Heidelberg and Freiburg, Germany (1972) and was an Administrative Trainee at Siemens AG from 1966-1968.

A list of publications is attached to this report as Appendix 2.

My fees are solely based upon my hourly rate for professional services provided by me (hourly rate on this engagement €750.00 or CHF 900.00 per hour plus any out-of-pocket expenses incurred). My fees are in no way contingent on the nature of my findings, or on any analyses, testimony, or the outcome of any proceeding.

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Background on Business One Acquisition

SAP's first product was R/1 (aka YSR) which was delivered to a subsidiary of ICI in Germany. R/2, the productized version of R/1, was only available on IBM and Siemens mainframes making the product unsuitable for many smaller enterprises. It was released in the late seventies. In the mid-eighties, SAP commenced development of a product targeted at the lower end of the market and subsidiaries of larger companies. The first customer, Deutsche Bahn, ordered 400 licenses to be installed on an IBM AS/400. The order was never fulfilled as SAP could not solve the performance problems.

In July 1992, SAP released R/3. R/3 was available on a variety of Unix platforms and much of the architecture and the business logic was ported from R/2. Initially, the product was suffering from functional deficits and performance issues. SAP limited the number of users to 100 and issued stringent sizing guidelines. Over time, these limitations were lifted as the product was better understood and more powerful hardware became available. SAP invested heavily into hand-holding partners trying to avoid unsuccessful implementations.

R/3 quickly became popular with larger companies who preferred its 3-tier architecture with its graphical user interface to the R/2 product, which was monolithic and tied to the mainframe architecture. The initial concerns of SAP revolved around scaling the product upwards and addressing the upper end of the market. Smaller companies were not a target until about 1995. However, even larger accounts started to look into using R/3 in smaller subsidiaries and found this to be difficult and costly. R/3 was complex and its user interface was not very intuitive. Hence, customers like Coca-Cola resorted to other vendors with products that could be deployed more easily and that had better cost of ownership properties. While SAP attempted to sell the benefits of standardizing on a single architecture for an enterprise, customers were reluctant to embark on this idea. It was very difficult if not impossible to get the cost of an R/3 implementation (i.e. hardware, software, training, implementation services) below USD 500,000.

SAP tried a number of approaches to downsize R/3 and preconfigure it. Of all these attempts, only SAP Business All-in-One has survived. SAP Business All-in-One is a packaged version of R/3 (or the Business Suite as it is called now) and serves as more of a marketing package than a product in its own right.

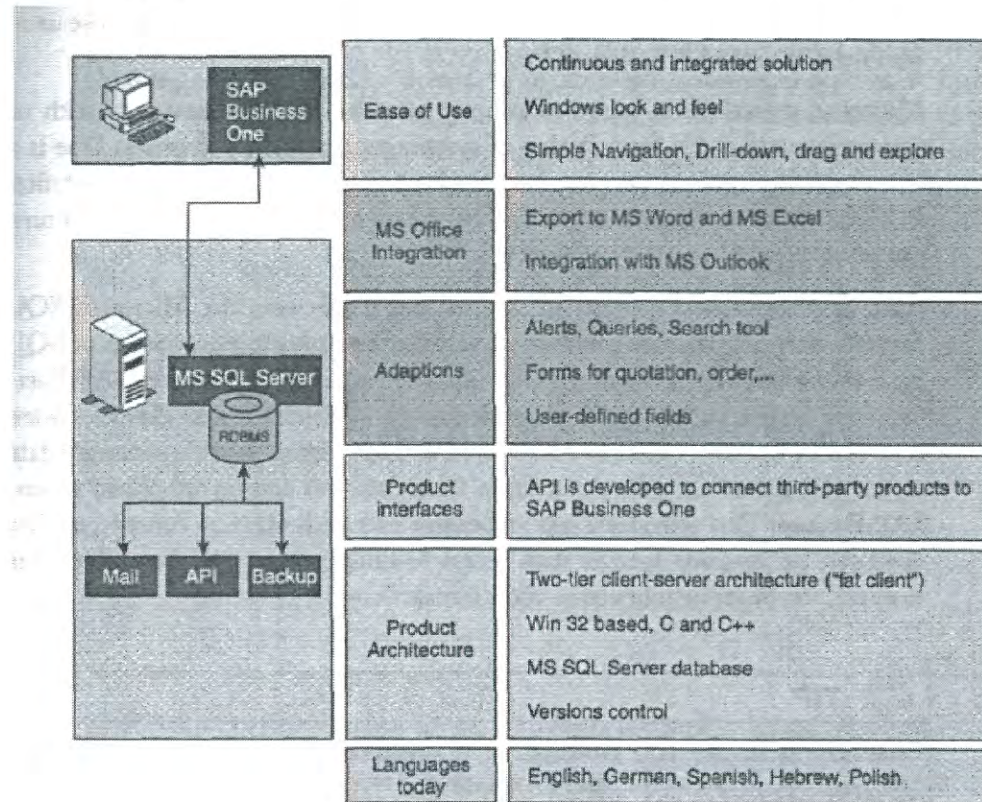
When Microsoft commenced entering the ERP market, SAP recognized that it needed a product with a better user appeal and lower cost and complexity. With much of the upper end of the ERP market saturated, the lower end of the market promised growth opportunities SAP could not tap with R/3.

In 2002, SAP purchased Top Manage, an Israeli company originally named Menahel. (Menahel means "principal" as e.g. a school principal). The company had been founded by the father of Shai Agassi (Reuben Agassi). The Top Manage product had limited functionality and was successful only in a few markets such as Poland and Brazil. Top Manage had sold a few hundred copies of the product in countries including Brazil, Poland and Israel and did not have the full range of languages and regulatory support features required at the time of the \$10 million (USD) transaction.

SAP invested heavily in extending the functionality and additional localizations of the Top Manage product and changed its name to SAP Business One.

Basic Architecture at the Time of Acquisition

At the time of the Top Manage acquisition, the basic architectural structure of Business One was that of a two-tier client/server application. SAP Business One is a “fat client” application, meaning the business logic runs on the user’s workstation PC.



• Figure 1 Basic Business One Architecture and Functionality¹

This basic architecture has been retained by SAP. The consequences of this choice are discussed herein.

¹ See Teufel et. al., p. 11

SAP Business One – The Architecture and the Consequences

The architecture of Business One is a classical, proverbial fat client architecture. This architecture, as implemented by SAP, utilizes the presentation server (or client) to run the application logic and relies on a shared database server for data storage.

The original idea behind this concept was to use the processing power available on the client's personal computers (PCs). With PC processing power being consistently less expensive than server processing power and clients typically running at 5% CPU utilization or lower, this concept appeared to be very tempting when developed more than 15 years ago.

A number of vendors adopted fat client architecture, and some are still using it today. SAP, however, decided to opt for a different architecture for R/3 in the early 1990s when it laid the ground for its successful R/3 product suite (now referred to as SAP ERP). The two-tier architecture was discarded for a number of good reasons:

- When the number of users exceeds 100, performance begins to deteriorate. This limitation is a result of the server maintaining a connection via “keep-alive” messages with each client, even when no work is being done.³
- Current implementations of the two tier architecture provide limited flexibility in moving (repartitioning) program functionality from one server to another without manually regenerating procedural code.⁴
- The two-tier client server architecture is not well suited to balance load and memory requirements between users. This results in over-configuration because you cannot “steal” idle capacity from other clients. In a shared application server environment, the operating system would provide mechanisms for load balancing.
- Similarly, all reconfiguration possibilities available in modern cluster architecture are absent in the application part of the two-tier architecture. They are simply too expensive for client PCs.
- Different from servers, client PCs cannot be utilized on high CPU-load levels. The client is primarily a user interaction device, and users quickly

³ See Carnegie Mellon University

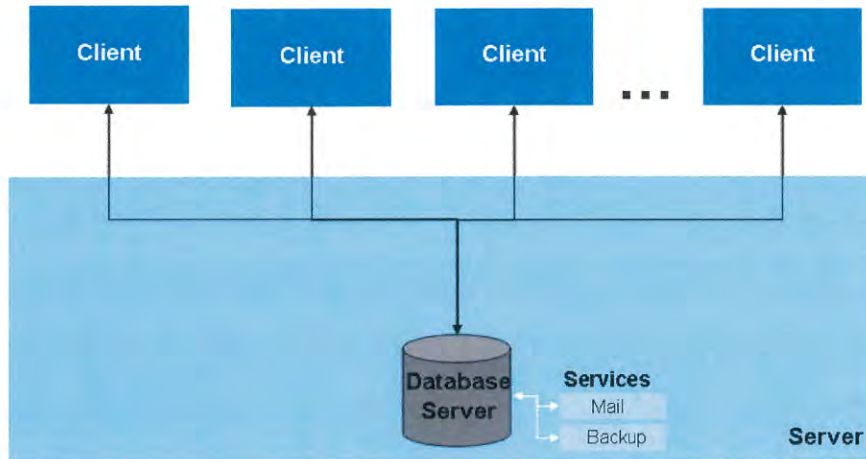
http://jano.unicauca.edu.co/cursos/Enfasis_III/Documentacion/Referencias/Server_Software_Architectures.pdf as referenced on July 19, 2012

In recent years, some two-tier products benefitted from newer technology such as load leveling features for the client side, and when shared hardware is employed, the use of 64-bit architecture and larger memory for caching and the moving of business logic to the server including the leverage of stored procedures. In 2004, Business One did not use any of these features or devices, nor were there any such changes incorporated in the time frame between 2004 and 2008.

⁴ Ibid. See also Schussel, George. “Client/Server Past, Present, and Future” and Omer Aungkyawoo Piperdi, Kedar Sivashanmugam, Krishna Raju Datla Vamsi in their presentation “Server Architectures” p. 39, <http://www.academic.marist.edu/~jzbv/architecture/Projects/projects2004/ServerArchitectures.ppt> as referenced on July 19, 2012

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get angry about “sticky” keyboards – a feeling that quickly arises when clients are used at load levels above 30%. Hence, the speculation on “cheap MIPS” is largely an illusion.

SAP® Business One

• Figure 2 Business One uses a fat client architecture (Source: SAP)

- Worse, there are real architectural penalties. Since the application has to run on each client, it has to be either installed and maintained de-centrally or it must be distributed centrally. Ideally, it would be dynamically invoked from the common database server, but that limits the amount of code that can be loaded. To some extent, this can be overcome with sophisticated caching algorithms, but they are rarely used.
- Fat clients and the Internet do not work well together. The application code on the fat client cannot be distributed over the Internet, and the presentation part of the application is typically too intertwined with the application to allow it to be split off. Citrix has made a business from this situation. Users can install Citrix terminal servers or similar functionality from Tarantella to get almost any non-Internet compatible software to be used over the Internet. This, however, requires the introduction of another architectural layer in a rather inefficient way. Hence, such solutions are only justified when it comes to enabling legacy applications for the Internet. Administrating fat clients is more difficult and laborious. They need frequent upgrades and they are more vulnerable in terms of security.

In this environment, SAP refrained from using the two-tier client/server architecture. Ultimately, even PeopleSoft re-architected its whole application suite in an admission that the two-tier approach was not scaleable enough. PeopleSoft CEO Craig Conway's issued the slogan “No code on the client” when he finally announced the re-architected PeopleSoft 8.

With all this, it should have been apparent for a mature vendor like SAP that the two-tier client/server is not the appropriate architecture. When SAP announced Business One, I and others were surprised that Business One had a two-tier client/server architecture.

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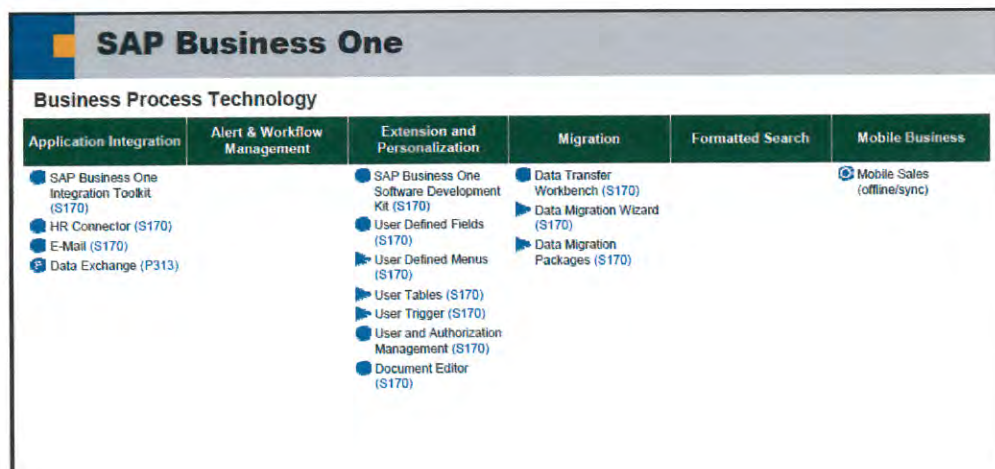
Even within the obvious limitations of the two-tier architecture, Business One appears to be restricted. After initially relying on Microsoft SQL Server alone, database support has been extended to IBM DB2 Express and Sybase. Linux is only available for the database server in the south-east Asia market. On demand offerings, gaining in popularity, are costly to implement as they require additional hardware. The scalability limitations do not allow for large, cost-effective implementations. 64 bit operating system support will be only available in the forthcoming version 9⁵.

Changes and Alterations made to Business One between 2002 and 2007

The main thrust for SAP when extending Business One was initially functionality and localization rather than scalability and remediation of inherent limitations and performance problems caused by the software's architecture.

In 2003, SAP released a solution map for Business One showing the areas in which functions existed (either from SAP or partners) and where functions were planned.

The solution map did not offer any information on performance related measures. The integration interfaces that are part of the Software development Kit ("SDK") and the DI API were not mentioned in detail⁶:



• Figure 3 Business One Solution Map Business Process Technology in 2003 (Source: SAP)

⁵ As presented by Andreas Wolfinger, VP SAP and head of global product management in June, 2012.

⁶ See SAP Business One Solution Map Edition 6.01, created June 10, 2003 <http://www.microchannel.com.au/download/Business-One-Brochures/SAP%20Business%20One%20-%20Solution%20Map.pdf> as referenced on July 13, 2012

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2004C⁷

In the 2004C release issued in 2005, SAP addressed the following topics:

Localization for Russia, Poland, Hungary, Slovak Republic

Accounting enhancements such as enhancements for dunning, workflow, cash allocation

Sales and purchase

Planning (MRP, what-if-scenarios, sales forecasts etc.)

Production order enhancements

Inventory management

CRM enhancements

Service features

Human resources: employee master data

SDK (software development kit) enhancements

DI Server (meant to support higher volume data interchange by offering connection pooling)

User defined objects

New methods in matrix

New DI objects

General enhancements such as print preview, export to file, dot matrix printer support and more.

In the context of the Hodell project, the DI server and its connection pooling mechanism could have played a role as it was designed to support higher volume and yield better performance than the DI API although no details were given. However, the connection pooling mechanism was mainly meant to speed up traffic with multiple clients/users. Hence, it appears to be of no help if performance problems are experienced even when running only one client using DI.

The other 2004C enhancements do not appear to have relevance to Hodell's problems.

2005A Release

The main features of 2005A (released November 2005)⁸ were:

⁷ See SAP Business One 2004C Release notes published May 2005

⁸ See SAP Business One 2005A release notes <http://www.sdn.sap.com/irj/scn/index?rid=/library/uuid/ac404451-0401-0010-119e-c6ded6826acd> as referenced on July 13, 2012

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Multi-Language Support in Marketing Documents

Inventory Audit Report

Bank Reconciliation Process

Enhancements in the following areas:

Banking

Sales and Purchasing

Inventory

Customer Relationship Management

Production

Reporting

Financial reports

Accounting Reports

XL Reporter

Print Layout Designer

Support Tools

System Administration and Administration Tools

Installation and Upgrade

SAP Business One 2005 A Country-Specific Highlights

Software Development Kit (SDK)

Data Interface (DI) API (here new objects and services were added, but no performance improvements appear to have been included)

User Interface (UI) API Enhancements

Add-On Administration

2007A

In the release notes for 2007A (released September 2006), the following features and enhancements were announced⁹:

Highlights

Accounting

Tax Reporting

Financial Reports

Sales and Purchasing Documents

Inventory

Usability

Documentation and

Management and Control Features

Software Development Kit (SDK)

Performance and Infrastructure

Add-Ons

SAP Business One Integration

Of all these items, again only the DI related changes are of interest.

DI also received another performance feature¹⁰:

“New Connection Interface

When running several DI add-ons, performance may degrade significantly, because each additional connection to the DI API loads a new DI and ObServer DLLs. Performance can be improved by using a new connection interface to DI API. This method is recommended when running multiple DI addons connected to the same company database.

As in the case of the DI server, this feature appears to improve situations where multiple DI applications are running concurrently. As Hodell had poor performance even in cases where that was not the case, this improvement would likely not have solved the problem.

(The next major enhancement was called 8.8 and was issued in October 2009 and falls outside the scope of this report)

⁹ See SAP Business One 2007A Release Notes September 2006

¹⁰ See SAP Business One 2007A Release notes, p. 11

The Hodell Software Environment

I am informed that during all relevant times, Hodell-Natco Industries, Inc. was a distributor of fasteners and chains, headquartered in Cleveland, Ohio, with an inventory consisting of approximately 40,000 items distributed from several locations in the United States. I am further informed that commencing in 2003, Hodell commenced a search for a software solution which would provide integrated financial and sales management capabilities for its growing business and that it was essential to Hodell that whatever software it purchased would accommodate its then existing number of users (approximately 80) as well as accommodate the growth Hodell-Natco expected over the useful life of the software. I understand that Hodell communicated its user capacity, its plans for growth, and other needs to the potential vendors for its software needs. I understand that in December, 2004, Hodell entered into a Development Agreement with LSi-Lowery Systems, Inc., a SAP channel partner, and issued a purchase order for an 80 user software license for SAP Business One. I am advised that it was then understood that Hodell would be purchasing up to an additional 220 licenses for Business One beyond the 80 initially purchased. In December, 2005, Hodell purchased an additional 40 licenses. I am informed that between 2004 and 2008, Hodell worked diligently with SAP's channel partner to implement the Business One software, but ultimately concluded that the installation was a failure. I understand that Hodell is seeking to recover damages from that failed installation from SAP and its channel partner. In rendering the opinions contained in this report, I expressly assume the accuracy of these facts and the accuracy of the other facts specific to Hodell referred to herein, including, but not limited to, the software environment described below.

The Hodell software environment may be briefly characterized by the following:

Multiple user locations

One central system handling core ERP functions

Orders with many line items

Many business partners

Orders can be shipped to many targets

Large data base (over 40 GB)

Requirements for quick order processing (although not explicitly stated, I assume that anything that exceeds 1 minute is not acceptable)

120 concurrent users

Planned acquisitions resulting in additional users yielding a total of 300 or even 500 concurrent users and, very likely, a corresponding increase in data volume.

See also "Analysis of SAP Business One and its Suitability for Hodell" for a discussion on how this matched with SAP Business One's capabilities.

Customer Expectations at Time of Purchasing Software

Customer expectations for ERP software vary. Experienced customers expect a number of issues and are prepared to encounter limited cost and time overruns of up to 20%. ERP software is, unlike e.g. Microsoft Word, not a product category that can be used without changes and adaptations. Up to 30% of the functionality may be subject to such customizations. While customers of smaller vendors seek to be better supported with their special requirements, those who turn to market leaders like SAP expect industry quality reliable execution of an organization that does not spontaneously have to invent every step.

All customers expect to get a working solution that supports their business with no or little disruption. They expect a sizable net improvement over the pre-existing solution that can grow and be changed as required allowing for a decade of amortization. Customers cannot afford to relinquish control over their own destiny to the software vendor and its partners.

Analysis of Software Companies using Early Entrants to Beta Test

Software companies (in particular vendors for enterprise software) have a hybrid position: they need to be experts in making software and also have a deep understanding of the business of their customers. Vendors such as SAP cater to a wide variety of industries. In many cases, their customers have a better understanding of the business.

When it comes to introducing new products and technologies, software vendors usually apply various quality assurance methods. These methods cover all stages from requirements definition to testing of the marketable product. There are, however, two important caveats:

- With the many features ERP software has, it is impossible to fully test all features and assure their fast execution. This is a dilemma of all complex software products – from the software of smartphones to imbedded software in cars. Hence, there are residual risks that cannot be fully eradicated in a laboratory environment. Moreover, further tests may be so costly and time consuming that the software may miss the market window of opportunity.
- ERP software is different from products like Microsoft Word or other “shrink wrap” products, and is by no means a fully finished product in the sense that it can be used as shipped. To make the product usable, it requires several adjustments to fit the customer’s environment.

Software vendors need the cooperation of their customers when introducing new versions or totally new products. Usually, these beta customers (elsewhere called ramp-up customers) are carefully selected by the vendor. The beta program is supported by vendor experts that are part of the development team or at least close enough to these experts to quickly solicit help without the normal red tape. It is best practice to make beta customers aware of the risks associated with the new software and they are encouraged to keep older solutions and only stepwise increase their dependency on the new solution. Vendors frequently sweeten this cooperation by extra discounts and similar concessions.

Software vendors selling through partners frequently take a more liberal attitude in that they let their partners take a larger portion of the risk associated with the beta

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program. While this is understandable (the partner gets a margin and it is reasonable to expect that he provides added value in return), it is important that the vendor understands the limits of this approach. In a beta program, partners must be experienced and they need to receive special training to handle problems with a minimal turn-around time and the highest possible quality. It certainly is not best practice to have a partner involved who is new to the product. Under no circumstance should a partner be allowed to handle a beta situation that is pushing the limits of the product unless the software vendor has a direct presence in the project and the customer is fully briefed on the risks and the possible effects on his business. Beta programs have unavoidable risks but those risks can and need to be controlled.

Analysis of SAP Business One and its Suitability for Hodell

SAP, after years of enhancing and developing Business One, positions the product in the 2009 statement of direction for the 8.8 set of releases¹¹:

“Broadly speaking, SAP Business One customers usually:

Have 10–100 employees and typically fewer than 30 professional users

Have up to €50 million in annual revenue/turnover and 100,000 transactions per year

Have outgrown their accounting-only system and would like to see all of their business information in one integrated system

Have no more than 5 physical warehouses

Have relatively straightforward business processes

Are in a service, wholesale, retail, or light manufacturing industry

Are an independent small business, or an autonomous subsidiary or satellite operation needing to integrate with their parent company (SAP enterprise customer or other large company) using periodic summary reconciliations

Have limited IT capability, with a preference for an on-premise system

Please note that the above characteristics are only directional in nature and a business partner will need to assess the customer’s unique situation to determine if SAP Business One is a good fit.”

In the 2007 statement of direction, SAP still had a bolder claim with regard of the number of users¹²:

“10–100 employees, approximately half of them using SAP Business One concurrently”

¹¹ This is the current release. See SAP Statement of Direction, January 2009, p. 6

¹² SAP Statement of Direction Business One 2007, November 2006, p. 8; version 2.0 released March 29, 2006

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Normally, software vendors tend to increase the number of users as newer technology becomes available. Apparently, SAP had reasons to become more conservative. The 2007 statement of direction recommends to partners:

“If you feel that your prospect is a good fit for SAP Business One, but falls outside of these guidelines, we strongly recommend you discuss the situation with your SAP channel manager.”

Hodell, however, had different requirements even in 2004-2005: they bought licenses for a total of 120 users with expectations communicated at the time of the purchase that up to 300 users would be required during the next 5-10 years. In 2004, when SAP first was contacted about the opportunity, the initial demand was stated to be 80 users and 5 warehouses with a solid opportunity of doubling the number of users in the near future through acquisitions.

With the initial implementation, Hodell reached a database size that was way beyond what Business One could handle¹³:

150000 SKUs

20000 customers

7500 vendors.

In testing conducted in Israel, aimed at reaching the system limits, SAP had only 60000 items (or SKUs) and 16000 business partners. The Hodell requirements were more than a factor of two higher.

The architectural limitations of Business One prohibit resource balancing on the application level as the logic is part of the client software. That does not change in a Citrix environment.

Furthermore, Business One was and is suffering from database-related deadlock situations that were addressed a number of times without profound improvement. SAP plans to fix this in the forthcoming version 9 and finally by switching to a different database concept in 2014/2015¹⁴.

In 2006, other projects such as the implementation at Weidmüller Interface GmbH & Co.KG¹⁵, showed similar issues. Weidmüller noted that Business One had difficulties handling their 11GB database, tended to lock up because of a database blocking process (no resolution in sight at the time of reporting). Hodell's database was far bigger: 43GB¹⁶.

¹³ See email from Edward Neveux to Ralf Mehnert-Meland, both SAP, on March 13, 2006

¹⁴ See presentation by Andreas Wolfinger, SAP AG, Vice President Head of Global Product Management

June 2012, page 10

¹⁵ See presentation by Torsten Hopmeier, CIO, given on March 2nd, 2006

¹⁶ See email October 17th, 2007 from Ed Neveux, SAP to Killingsworth, et al.

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Business One, without the InFlight add on, showed poor performance in tests that were carried out by SAP¹⁷. This is in line with the expectations that can be derived from the architectural limitations of Business One 2007 (mainly lack of efficient caching, only 32-bit operating system support). Times measured by SAP's employee Gadi Barnea for characteristic tasks were between 25 seconds and 80 seconds – by far too long. With double the number of users it is reasonable to expect these numbers to increase significantly.

This already intolerably poor performance became significantly worse with the Radio Beacon and InFlight add-ons installed on Business One. Hodell had previous experience with InFlight, albeit in a different technical implementation.

The InFlight add-on was ported to Business One using the Business One SDK, in particular the DI API. The SDK is based on Microsoft technology. The advantage of the Business One SDK is that it makes upgrades and maintenance of Business One much easier as the add-on interfaces through a cleaner architecture at the expense of performance. Hence, a direct port from older environments is not advisable. Instead, careful investigation of the new environment and the performance impacts is required. This is not an easy task and requires deep understanding of both the add-on and the base product. Serious and intensive technical cooperation between the vendor (here SAP) and the partner (LSI/IBIS) is required. Even then, due to the Business One architecture, serious performance impacts are likely to occur.

The programmers at IBIS raised a number of questions very early indicating that they had serious problems achieving the desired performance.¹⁸ SAP failed to address this serious situation and provided only superficial assistance rather than accompanying and monitoring, and supporting the development process.

When work on the InFlight port commenced, the Business One SDK was quite new. Development environments mature by being used. Software partners stress the quality and performance causing the software vendor to improve the SDK. In 2005, the SDK was new and the organization supporting it in the United States was new to the product. Furthermore, management was slow to understand the dangers involved and did not react timely.

Paul Killingsworth, one of SAP's escalation managers for the SAP Business One software, summarized the Hodell issues in March 2008 in an e-mail¹⁹ by saying that the debacle was caused by:

- “Database size and administration
- Transaction volume
- Hardware/network infrastructure
- Business One DI-API and UI-API architecture

¹⁷ See email from Gadi Barnea July 8, 2007.

¹⁸ See email from Edward Neveux, SAP to Joe Guagenti, IBIS Group dated December 19, 2005

¹⁹ See email from Paul Killingsworth, SAP, to Jim Gillespie, Fast Rite, dated March 25, 2008

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- In Flight Enterprise architecture”

He was correct. His advice, to involve solution architects in the process of making a major performance sensitive add-on was equally correct. However, both the assessment and the advice came way too late for Hodell.

Business One Sweet Spot

As already explained in the section above, SAP is even now somewhat vague about what the upper limits of load and data volume are for successfully deploying Business One.

The most definitive statement in the context of the Hodell case is the one from Udi Ziv,²⁰ General Manager of SAP’s Small Business Solutions. On April 12, 2007 – weeks after Hodell went live on the software,. Mr. Ziv acknowledged that 120 users was definitely outside of the Business One sweet spot. Many vendors with parallel product lines have a certain amount of competition between them. This competition is sometimes carefully managed (e.g. Volkswagen) or it is subject to a certain amount of “laissez faire”. In the case of Business One, SAP to the very day has been very vague to provide hard and easily implementable rules.

In my opinion, the implementation of Business One in the releases 2005 to 2007 had problematic scalability beyond 70 users and 10 GB database size.

There are, however, other factors limiting the sweet spot. One such factor is the organization provided by the vendor to support the product in both presales and aftersales situations. This ability may even vary by geography. Judging from the way the Hodell case was handled, this ability is an even more aggravating factor than the product and its technology. Taking all factors into account like the complicated global infrastructure, the familiarity (or lack thereof) with the product, the desire to close big deals with a minimum of investment, I would even set the limit at a lower level. Hence, 50 users, a database of 7 GB and an annual transaction volume of less than 70000 transactions would appear to be a better definition.

Using the number of employees and/or annual revenue is not advisable in the context of technical sizing. These numbers have a place when it comes to determine candidate enterprise very early in the sales cycle. During the sales process, much deeper scrutiny is required to qualify the opportunity.

I believe all incoming orders should be screened for any indications of upcoming problems resulting in a more detailed scrutiny using information obtained from and endorsed by the customer such as number and description of peak load transactions, anticipated growth, database size and its expected growth. SAP certainly had the wherewithal to do that.

There is no evidence that between 2004 and 2007, the Business One code changes (bug fixes left aside), moved the sweet spot significantly up or down. There is also

²⁰ See email from Udi Ziv, dated April 12, 2007 to Dan Lowery

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no indication either that TopManage behaved differently with respect to performance and scalability.

Integration of Top Manage into SAP and the Impact on Quality

SAP has a number of quality assurance processes in place that were developed over many years learning from myriads of problems filed and, for the most part, solved.

When SAP bought Top Manage Software Inc., Top Manage had much less experience in this area. It was working with fewer customers, a small network of partners, and a small team. With SAP taking over Top Manage, the complexity of Top Manage's environment and its business increased by one or more magnitudes immediately.

Initially, SAP planned to integrate Top Manage like any other SAP development facility. This would have included quality assurance tests by organizations outside of Top Manage necessitating constant communication as mandated by the standard policies and procedures employed by SAP.

For over 5 years after the acquisition, the ex-Top Manage team stubbornly refused to integrate and share information. Instead, SAP was treated more like a business partner. Even for SAP, insight into how the team in Israel was working was very limited. In the end, Business One development and support was relocated to entities outside of Israel.

In 2005, some attempts were made to adopt SAP standard quality management methodology and to institute performance tests. Budget cuts significantly impacted this endeavor. SAP laboratories outside Israel contributed scripts but all the tests were run in Israel. It is best practice to separate QA from software development – often by selecting a different location for the tests. This was not done.

Udi Ziv, who originally came from Top Tier Software Inc., another company SAP had acquired in 2001, was one of the founding members of Top Tier. Shai Agassi, the son of Top Manage CEO Reuben Agassi, was then the CEO of Top Tier. Udi Ziv was General Manager at SAP's Small Business Solutions, where he was responsible for SAP's Small Business Solutions Product and Technology Unit, including strategy and execution and manages 500 people in seven locations worldwide. Mr. Ziv was also responsible for all operations of The Lab, including: finance, human resource, marketing, information technology, and facilities etc.²¹

An acquisition of Top Tier was similarly tempting. Products and technology appeared to be advanced and powerful. Much of this was created under the supervision of Udi Ziv. In the years to follow, part of the original appeal of Top Tier's technology vanished as a number of shortcomings and quality deficits became apparent. Hence, assigning Udi Ziv to be responsible for Top Manage and

²¹ See

<http://investing.businessweek.com/research/stocks/people/person.asp?personId=1134656&ticker=NICE:IT&previousCapId=40401079&previousTitle=Current%20TV%2C%20LLC> as referenced on July 9, 2012

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Business One without making sure that he was in complete compliance with the industrial standards SAP had established was a risk that SAP should not have taken.

Only after Udi Ziv left SAP in 2007, did SAP gradually gain more quality control over Business One.

The problems around Business One in the years 2004-2007 were further compounded by the lack of technical support in the sales process. The technical field organization (termed “ramp up team”) was reassigned to help with another competing project (then called A1S, today, after a massive redesign, known as SAP By Design). The Business One budget was curtailed to help fuel the development costs of A1S which by 2012 has reached a total of around 2 billion USD. In 2006, SAP considered switching Business One customers to A1S leaving Business One as an interim product. This added to the already problematic quality situation.

SAP handled the quality situation differently country by country. In Germany, the partners were grouped around an SAP midmarket subsidiary (Steeb Anwendungssysteme GmbH). Here, additional development and quality assurance reduced the number of casualties. Nevertheless, there were many problematic customers and some were switched to R/3 under generous terms or reimbursed before the customer’s business was severely impacted (e.g. Intersport).

Long turnarounds, buggy releases, lack of communication, unclear responsibilities were reported by many like SAP’s reference customer Weidmüller.²²

In summary, but not by limitation, I have the following opinions based on my knowledge, experience, review and analysis:

1. SAP Business One is inherently limited as to the number of concurrent users it can support. These inherent limitations are based upon the architectural qualities of Business One as described earlier in this report.
2. Based upon my experience and training, at the time Hodell signed the Development Agreement in December 2004, SAP and its business partner had sufficient information to determine that Hodell’s user requirements -- 120 immediate users and up to 300 over its useful life -- exceeded the software’s inherent limitations or, at a minimum, were a red flag as to whether the software should be sold to, and implemented, at Hodell.
3. Based upon my experience and training, at the time Hodell signed the License Agreement in December 2005, SAP and its business partner had sufficient information to determine that Hodell’s user requirements -- 120 immediate users and up to 300 over its useful life -- exceeded the software’s inherent limitations

²² Initially planned were 220 users in up to 12 countries. The project ran into severe problems with 2 countries implemented and the customer complained about deadlocks and Business One having trouble with large databases (>11GB). See <http://www.computerwoche.de/nachrichtenarchiv/554731/> as referenced on July 9, 2012 and presentation “Business One – Entscheidungskriterien und Praxiserfahrungen” by Torsten Hopmeier, CIO Weidmüller dated March 2, 2006

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or, at a minimum, were a red flag as to whether the software should be sold to, and implemented, at Hodell.

4. Based upon my experience and training, as of March 2007, SAP and its business partner had overwhelming knowledge and information that SAP Business One would likely not be a successful implementation – or at the very least was a highly risky implementation – such that they should have ceased the implementation and prevented Hodell from going live on the software.

5. Based upon my experience and training, with the initial implementation, Hodell reached a database size that was way beyond what Business One could satisfactorily handle.

6. In my professional opinion, the performance problems experienced by Hodell – namely slow performance of the software – were primarily caused by SAP Business One's inherent architectural limitations. While issues may have arisen with respect to the InFlight Add-on, those issues were independent of issues caused by SAP Business One's inherent limitations, and Hodell would have experienced unsatisfactory performance even if SAP Business One had been installed as a stand-alone product.

Dated: July 18, 2012

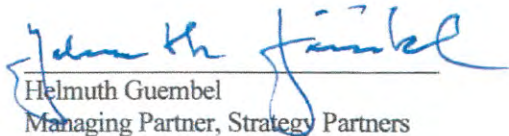

Helmuth Guembel
Managing Partner, Strategy Partners

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Abbreviations

API	Application Program Interface
CPU	Central processing unit
DI	Data Interface / Data Integration
DBMS	Database management system
ESA	Enterprise service architecture (SAP)
GUI	Graphical user interface
MIPS	Million instructions per second
SDK	Software Development Kit
SOA	Service-oriented architecture

Publications since 2002

All these publications were directly distributed by Strategy Partners International, mostly personalized.

Der Markt für SAP Betriebsdienstleistungen (German) (co-authored with Karin Henkel) October 2003

SAP Users –Time to Evaluate your SAP Investment May 2005

NetWeaver – Open Lock-in? December 2005

„So wird abgerechnet“ - Der Markt und das Angebot HR-Dienstleistungen (German) 2005/06 Helmuth Gumbel, Karin Henkel

SAP Business One –Simple, Affordable, Productive ERP for SMBs? June 1st, 2006

Is SAP NetWeaver a Good Basis for Enterprise Application Ecosystems? (co-authored with Henrik Klagges and Dr. Martin Wagner) July 2006

SAP All-in-One – Future Proof ERP for Midsized Enterprises? March 7, 2007

Information as a Strategic Asset, October 2008

HELMUTH GÜMBEL

OBJECTIVE

IT Analyst; subject matter expert in software / SAP related cases

EXPERIENCE

2011 – present University teacher at Munich University of applied sciences
Subject: ERP Systems

1996 - present **Strategy Partners International** Scuol, CH

Managing Partner, Research Director (see www.strategypartners.com)

- Main Focus: ERP (SAP), ERP-related services such as outsourcing, ASP, SaaS
- Strategic purchasing advice for ERP-customers
- Product management and marketing advisory services for vendors
- Initiator of the Sapience/Sapientia initiative to promote free competition in the SAP market

1989 - 1995 **Gartner** Munich Germany

Research Director, SMS and AAS Services

- Focus in the Strategic Software Management Service on system software, quantitative market research, European vendors
- Focus in the Administrative Application Service on ERP-vendors in Europe (mainly SAP, Baan, Tetra, Scala and a few other vendors)
- Service contact for all European clients for inquiries

1987 - 1989 **Digital Equipment** Munich, Germany

Consulting Unit Manager

- Built a new consulting and software development unit dedicated to providing advisory services to IBM-dominated accounts
- Development of IBM-SNA compatible communication software
- Part of Digital's worldwide ACT (Advanced Center of Technology) organization

1987 (6 months) **Software AG** Darmstadt, Germany

Senior Systems Architect

- System adapter architecture for all IBM-compatible operating systems supported
- Project management

1980 – 1986 **Nixdorf Computer AG** Munich, Germany

Manager Software 8890 Product Line

- Responsibility for all software activities for 8890 worldwide
- Management of laboratories in Richmond, Va., Chicago, Il., Dallas, Tx., Boston, Ma., Paderborn, and Munich with a total of 150 persons
- Handling of OEM-relationships with several vendors

- Handling of all externally sourced projects
- Product planning for current and future products
- Migration of Nixdorf's top selling Comet-application package (40000 plus installations, mainly with companies that today run SAP) to the 8890 line

1972 – 1980 **Siemens AG** Munich, Germany

Manager Product Planning BS 1000

- Managing the future development directions of the key Siemens operating system product for its mainframes for 1500 customers and 800 internal installations
- Coordination with laboratories in Minich, Namur, and Vienna
- Responsibility for development budget
- Cooperation with Fujitsu laboratories in Kamata

Development Manager Job Management

- Heading team of 25 persons developing job scheduling, job control, data set catalogue, job accounting, and access management services

System Architect

- Development of architecture and microcode for a new series of mainframes with advances operating system primitives embedded in microcode
- Specification of memory management, multiprocessing, and cluster management features
- Performance analysis and performance prediction

Operating System Development Specialist

- Development of job management features in the BSR, BS1000, and BS2000 operating systems
- Memory management and multiprocessing features for BS2000
- Specification of a new series of operating systems within the European Unidata cooperation together with M.B.L.E. Brussels and Philips in Eindhoven

EDUCATION

1966 - 1972 Universities of Heidelberg and Freiburg, Germany

- M.A. economics
- Graduated magna cum laude
- Programming courses

1966 – 1968 Administrative Trainee at Siemens AG

AGE, PLACE OF BIRTH

66, born in Heidelberg, Germany

APPENDIX TO REPORT OF HELMUTH GUMBEL

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